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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/830,204	04/21/2004	Brian Patterson	200310878-1	9035

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EXAMINER
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TO, JENNIFER N

ART UNIT	PAPER NUMBER
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2195

NOTIFICATION DATE	DELIVERY MODE
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10/27/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/830,204	<b>Applicant(s)</b> PATTERSON ET AL.	
	<b>Examiner</b> JENNIFER N. TO	<b>Art Unit</b> 2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1-8 and 10-20 are pending for examination.

#### ***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 19-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As per claims 19-20, they recited “an article of manufacture” comprising computer readable medium. Wherein the computer readable medium as defined in the specification, paragraph [0034], as any means that can propagate the program for use by the device (i.e. could include a carrier wave signal). The program code embedded in a carrier wave signal does not produce a tangible result. Therefore, claims 19-20 are directed to non-statutory subject matter.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. The following terms lacks antecedent basis:  
the queue – claim 5;
- b. The claim language in the following claims is not clearly understood:
  - i. as per claim 1, lines 3-4, it is not clearly understood what is meant by “measuring a parameter indicative of workload of an interface to a storage system” (i.e. measuring the workload of the storage controller or the workload of the storage system). For the purposed of examination, examiner will interpreted the limitation as “measuring the workload of the storage system”).
  - ii. as per claim 4, lines 6, it is not clearly understood what is mean by "measuring the parameter to obtain a current utilization" (i.e. measuring the measured parameter of claim 1 or a second measurement using the original parameter). For the purposed of examination, examiner will interpreted the limitation as “a second measurement using the original parameter”.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4, 7-8, 10, 14-16, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746).

5. Umberger was cited in the previous office action.

6. As per claim 1, Umberger teaches the invention substantially as claimed including a method of managing task execution in a storage system (abstract) comprising:

measuring a parameter indicative of storage system workload (paragraphs [0039], [0047], [0050], [0056]); and

assigning priority of tasks executable on the system based on the measured parameter (paragraphs [0005], [0008], [0011]-[0012], [0040], [0059]-[0063]), wherein assigning comprises assigning to individual tasks an allowable utilization value at which the individual tasks are authorized to execute (paragraphs [0062], [0065]).

Umberger did not specifically teach the allowable utilization value is indicative of importance of the task.

However, Umberger teaches that assigning to individual tasks an allowable utilization value at which the individual tasks are authorized to execute when the capacity of the system change (paragraphs [0062], [0065]).

It would have been obvious to one of an ordinary skill in the art at the time the invention was made to have recognized that the more the priority of the task is the more resources the task going to get. Thus, when the allowable utilization value at which the individual tasks are authorized to execute high, it is indicated that the individual tasks is importance. Therefore, it would have been obvious to one of an ordinary skill in the art at the time the invention was made to utilize Umberger's system as modified to allocate execution of tasks based on details characteristic of a workload (Umberger, paragraph [0012]).

7. As per claim 4, Umberger teaches maintaining a queue of tasks, the individual tasks having the assigned allowable utilization values (paragraphs [0039]-[0041]), measuring a current available value (paragraphs [0047], [0049]-[0050]; querying the tasks on the queue in the queue order [paragraph [0051]), executing a queried task that has an assigned allowable utilization value higher than the current available value and deferring to a next task on the queue, if any, for a queried task that has an assigned allowable utilization value lesser than the current available value (paragraphs [0051], [0059]-[0066], [0067]).

8. As per claim 7, Umberger teaches maintaining a data structure associated with a utilization task queue indicative of allowable utilization of all tasks on the queue (paragraph [0039]); and executing or deferring execution of all tasks on the utilization

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task queue based on the data structure and a measurement of current utilization (paragraph [0040]-[0041]).

9. As per claim 8, it is rejected for the same reason as claim 1 above. In addition, Umberger teaches an array controller (fig. 1, array controller 102), a performance measurement utility (fig. 3, item 303), and a task management utility (fig. 3, item 304), and a queuing utility that maintains a task queue and processes the tasks based at least in part on a current measurement of storage array workload (paragraphs [0039]-[0040], [[0046]).

10. As per claim 10, Umberger teaches that wherein the task management utility operates in combination with the queuing utility and the performance measurement utility to maintain a queue of tasks with each task assigned a threshold utilization, periodically measure current utilization, and execute tasks on the queue in the queue order so long as the current utilization meets the task threshold utilization (paragraphs [0039]-[0041], [0047], [0060]-[0063], [0065]-[0067]).

11. As per claim 14, it is rejected for the same reason as claim 7 above.

12. As per claim 15, Umberger teaches the storage array is a Redundant Array of Independent Disks (RAID) array in a structure selected from among RAID0, RAID1,

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RAID2, RAID3, RAID4, RAID5, RAID6, RAID7, and RAID10 9 (paragraphs [000069]-0076]).

13. As per claim 16, it is rejected for the same reason as claims 8 and 10 above. In addition, Umberger teaches an interface capable of coupling to a storage array (fig. 1).

14. As per claims 19-20, they are rejected for the same reason as claims 1, 8 and 10 above.

15. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in claim 1 above, and in view of Ikeuchi et al (hereafter Ikeuchi) (U.S. Patent No. 7159071).

16. Ikeuchi was cited in the previous office action.

17. As per claim 2, Umberger teaches the invention substantially as claimed in claim 1 above. Umberger did not specifically teach wherein the parameter comprises host input/output operations per units time and counting a number of host input/output operations per unit time as the parameter indicative of workload.



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18. However, Ikeuchi teach wherein the parameter comprises host input/output operations per units time and counting a number of host input/output operations per unit time as the parameter indicative of workload (col. 7, lines 35-42).

19. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Ikeuchi because both of the systems are dealing with the same field endeavor for addressing the need of managing the workload of the storage system and by incorporated the teaching of counting a number of host input/output operations per unit time as the parameter indicative of workload as suggested in Ikeuchi into Umberger 's system would produce a storage system that capable of controlling the load balance of the disk in a RAID configuration (Ikeuchi, col. 2, lines 36-37).

20. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in claim 1 above, and in view of Elliott, Jr et al (hereafter Elliott) (U.S. Publication No. 20040205102).

21. Elliott was cited in the pervious office action.

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22. As per claim 3, Umberger teaches the invention substantially as claimed in claim 1 above. Umberger did not specifically teach wherein the parameter comprises interface bandwidth utilizes as a proportion of interface bandwidth capacity.

23. However, Elliott teaches wherein the parameter comprises interface bandwidth utilizes as a proportion of interface bandwidth capacity (paragraph [0057], lines 6-10).

24. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Elliott because both of the systems are dealing with the same field endeavor for addressing the need managing system network and by incorporated the teaching of interface bandwidth utilizes as a proportion of interface bandwidth capacity as suggested in Elliott into Umberger 's system would produce a system that capable of managing the bandwidth requirement of the system (Elliott, paragraph [0001], lines 1-2).

25. Claims 5-6, 12-13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in claims 1, 8, and 16 above and in view of Courtright II et al (hereafter Courtright) (U.S. Patent No. 6157963).

26. Courtright II was cited in the previous office action.

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27. As per claims 5-6, Umberger teaches the invention substantially as claimed in claim 1 above. Umberger did not specifically teach maintaining a plurality of task queues including a task queue that bases execution on assigned and measured utilization, at least one task queue with a priority that differs from the utilization based queue, and maintaining a high priority task queue for queuing and executing, in the queue order, tasks assigned a high priority, and maintaining a utilization task queue for queuing and executing tasks, when the high priority queue is empty, in an order based in part on the order of queuing and in part on assigned allowable utilization value of a task and a measured current utilization value.

28. However, Courtright teaches maintaining a plurality of task queues including a task queue that bases execution on assigned and measured utilization, at least one task queue with a priority that differs from the utilization based queue, and maintaining a high priority task queue for queuing and executing, in the queue order, tasks assigned a high priority, and maintaining a utilization task queue for queuing and executing tasks, when the high priority queue is empty, in an order based in part on the order of queuing and in part on assigned allowable utilization value of a task and a measured current utilization value (fig. 3; col. 4, lines 55-67; col. 5, lines 1-43; col. 6, lines 1-67; col. 7, lines 1-63; col. 8, lines 21-62).

29. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Courtright because

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both of the systems are dealing with the same field endeavor for addressing the need managing I/O tasks (requests) in a storage system and by incorporated the teaching of using different queues to managing I/O tasks as suggested in Courtright into Umberger 's system would improve the integrity of Umberger's system by providing a system that scheduling I/O tasks to one or more disk drives or arrays in such a way that preventing lower priority I/O tasks are not starved of resources (Courtright, col. 1, lines 54-55; col. 2, lines 3-4).

30. As per claims 12-13, and 17, they are rejected for the same reason as claims 5-6 above.

31. Claims 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Umberger et al (hereafter Umberger) (U.S. Publication No. 20020091746), as applied in claim 8, and 16 above and in view of Guha et al (hereafter Guha) (U.S. Patent No. 7152142).

32. Guha was cited in the previous office action.

33. As per claim 11, Umberger teaches the invention substantially as claimed in claim 8 above. Umberger did not specifically teach the parameter comprises host input/output operations per unit time, interface bandwidth as a proportion of bandwidth

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capacity, disk busy, disk transfers per second, kbyte throughput per second, number of input/output operations per time interval, and input/output wait percentage.

34. However, Guha teaches the parameter comprises host input/output operations per unit time, interface bandwidth as a proportion of bandwidth capacity, disk busy, disk transfers per second, kbyte throughput per second, number of input/output operations per time interval, and input/output wait percentage (col. 8, lines 45-64).

35. It would have been obvious to one of an ordinary skill in the art at the time the invention was made to combined the teaching of Umberger and Guha because both of the systems are dealing with the same field endeavor for addressing the need of managing the workload of the storage system and by incorporated the teaching the parameter comprises host input/output operations per unit time, interface bandwidth as a proportion of bandwidth capacity, disk busy, disk transfers per second, kbyte throughput per second, number of input/output operations per time interval, and input/output wait percentage as suggested in Guha into Umberger 's system would improve the integrity of Umberger 's system by providing a storage controller that automatically adapts the data organization in order to satisfy different workloads (col. 3, lines 65-66).

***Response to Arguments***

36. Applicant's arguments filed 06/22/2009 have been fully considered but they are not persuasive.

37. In the remark, applicant argued that Umberger fails to teach setting the priority of tasks executable in the system by the measured parameter.

38. Examiner respectfully disagreed with applicant. Umberger teaches measuring a parameter indicating the storage workload (paragraph [0047], determining utilization rates indicating the storage workload), and presetting the priority of various tasks based on the system condition/criteria (paragraph [0040]). Thus it is clearly shown that Umberger teaches setting the priority of tasks executable in the system by the measured parameter.

***Conclusion***

39. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure (see attached PTO 892 form for details).

40. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

41. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER N. TO whose telephone number is (571)272-7212. The examiner can normally be reached on M-T 6AM- 3:30 PM, F 6AM- 2:30 PM.

42. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

43. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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